

**WHAT IS CLAIMED IS:**

1. In a helicopter of the type having a helicopter turbine engine mounted therein, the improvement comprising a “hot-start” avoidance system including:

a collective and a tactile warning device operatively connected to said collective;

data storage means and means for inputting a safe temperature profile for startup of a helicopter turbine engine;

means for measuring the actual temperature profile during a startup of the helicopter turbine engine; and

means for actuating said tactile warning device when the actual engine temperature during an engine startup falls outside of the safe temperature profile to thereby warn a pilot to abort the startup of a helicopter turbine engine.

2. In a helicopter of the type having a helicopter turbine engine mounted therein, the improvement comprising an over stress avoidance system including:

a collective and a tactile warning device operatively connected to said collective;

data storage means and means for inputting a safe temperature profile for startup of the helicopter turbine engine;

means for measuring the actual turbine output temperature of a helicopter turbine engine during a startup of the engine;

means for activating said tactile warning device when the actual engine temperature during an engine startup falls outside of the safe temperature profile to thereby warn a pilot to abort the startup of the helicopter turbine engine; and

means for enabling the tactile warning device for a response to a dangerous condition during flight operations.

3. A method for starting a helicopter turbine engine and avoiding a “hot-start” comprising the steps of:

providing a collective and a tactile warning device operatively connected to the collector;

providing a safe temperature for starting the helicopter turbine engine;

measuring an actual turbine output temperature of the turbine engine during the startup thereof;

comparing the actual temperature and the safe temperature; and

activating the tactile warning device when the actual engine temperature during an engine startup exceeds to thereby warn a pilot to abort the start of the engine.

4. A method for protecting a helicopter of the type having a helicopter turbine engine against “hot-starts” during startup thereof and against other dangerous conditions during flight operations, the method comprising the steps of:

providing a pilots control stick and a tactile warning device operatively connected to the control stick;

providing a safe temperature profile for startup of a helicopter turbine engine;

measuring an actual turbine output temperature of the engine during startup;

activating the tactile warning device when the actual turbine output temperature during startup falls outside of the safe temperature profile and aborting the startup in response to the tactile warning; and

enabling the tactile warning device for a response to a dangerous condition during flight operations.

5. A helicopter turbine engine over stress warning system comprising:

a helicopter;

a helicopter turbine engine mounted in said helicopter;

a pilot control stick and a tactile warning device operatively connected to said pilot control stick;

data storage means and means for inputting a safe turbine output temperature profile for startup of the helicopter turbine engine and other safe operating parameters during flight of the helicopter;

means for measuring actual turbine output temperature during startup of the turbine engine and for detecting actual turbine output temperatures and other actual parameters during flight of the helicopter; and

means to activate said tactile warning device when the actual turbine output temperature during startup exceeds the safe turbine output temperature during startup and when the safe turbine output temperature or other safe operating parameters are exceeded during flight operations to thereby warn a pilot to take corrective action.

6. A helicopter turbine engine over stress warning system according to claim 5 in which said pilot control stick is a collective.

7. A helicopter turbine engine over stress warning system according to claim 5 in which said tactile warning device is a collective shaker.

8. A multi-function tactile warning system for a helicopter of the type having a helicopter turbine engine, said system comprising:

a pilot control stick and a tactile warning device operatively connected to said pilot control stick;

data storage means for inputting safe operating parameters during startup of a turbine engine and during flight of a helicopter;

means for measuring actual startup and actual operating parameters of the helicopter turbine engine during startup and during flight of the helicopter;

means for activating said tactile warning device when an operating parameter is exceeded during a startup of the turbine engine to warn a pilot to abort the start; and

means for activating said tactile warning device when a safe operating parameter is exceeded during flight of the helicopter.

9. A method for protecting a helicopter of the type having a helicopter turbine engine against "hot-starts" during startup thereof and against other dangerous conditions during flight operations, the method comprising the steps of:

providing a pilots control stick and a tactile warning device operatively connected to the control stick;

providing a safe temperature profile for startup of a helicopter turbine engine and critical parameters for flight operations;

monitoring an actual turbine output temperature of the engine during startups;

activating the tactile warning device when the actual turbine output temperature during startup falls outside of the safe temperature profile and aborting the startup in a response to the tactile warning;

monitoring the actual parameters for the safe operation of a helicopter during flight operations;

activating the tactile warning device at a first preselected magnitude when an actual parameter for a dangerous operation is approached; and

increasing the magnitude of the tactile warning when a dangerous condition exists.

10. A method for protecting a helicopter according to claim 9 in which the frequency of the tactile warning in response to an impending dangerous condition is increased when the dangerous condition is imminent.